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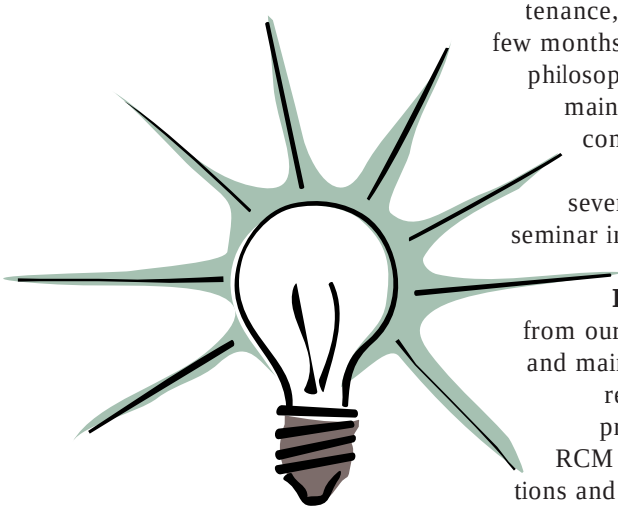
Reliability-centered maintenance—turning philosophy into reality



A year ago, Upper Great Plains maintenance staff took a short course in reliability-centered maintenance, or RCM. Over the last few months, they've put the RCM philosophy to work to improve maintenance practices and contain costs.

"Back in April 1999, several of us attended an RCM seminar in Bismarck," recalled UPG General Engineer **Mark Buchholz**. "Later, staff from our state maintenance offices and maintenance engineering met regularly to develop a pilot program to implement RCM philosophies for substations and transmission lines."

RCM focuses on identifying critical components in a system and uses preventive and predictive maintenance practices to repair or replace equipment as needed. It considers the actual conditions under which equipment is operated. In theory, this approach is more cost-effective than relying solely on traditional time-based maintenance schedules.

Part of the pilot for transmission lines has centered on full-scale strength testing for new and in-service crossarms. "The idea is to determine the expected strength-values of crossarms based on National Electrical Safety Code criteria for both solid sawn and laminated crossarms," explained Buchholz. "We'll use that information to refine specification requirements and determine future replacement schedules."

The region has also performed a structural analysis and reliability assessment on the Fort Randall-Mount Vernon 115-kV line in south central South Dakota. Originally built in the early 1950s, the line section was scheduled to be replaced due to its age. Performed in cooperation with CSO engineering and Engineering Data Management of Fort Collins, Colo., the assessment showed repairing several structures and their components would extend the line's life expectancy 20 years and cost less than $130,000. Total replacement would have cost an estimated $4.9 million.

UGP has also performed several life extension projects on other lines including the Mission-Martin 115-kV line; the Martin-Philip 115-kV line; and the WJ Neal-Rugby 115-kV line. "All these projects, as well as the Havre-Shelby 115-kV line rebuild in north central Montana, will bring the lines up to NESC and Western design standards," Buchholz noted. "That increases system reliability."

Other RCM initiatives for transmission lines include a review of the inspection and treatment contracts for wood poles, resulting in a move from 10- to 12-year inspection cycles and lowered overall maintenance costs.

The pilot program will also examine substations in Dawson County, Bismarck, Huron and Rapid City and will include:

- an analysis of past and present maintenance history and practices,
- review of diagnostic testing and equipment monitoring practices presently in place,
- potential incorporation of on-line monitoring of critical equipment in each facility and
- automation of data collection from substation inspections.

"The RCM pilot program creates the proving grounds for new technology and improved strategic maintenance practices to continue Western's mission for reliable cost-based power," added UPG Electrical Engineer, **Edgar Ayoroa**, who has been coordinating the pilot program for substations.

Using RCM, the region intends to build a program that provides an accurate picture of system conditions. "With the information we gain through inspection and monitoring, we'll be able to schedule maintenance of individual pieces of equipment as necessary and better track equipment needs through MAXIMO," said Buchholz. "We'll also be able to justify capital expenditures in greater detail through condition monitoring and failure analysis."

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